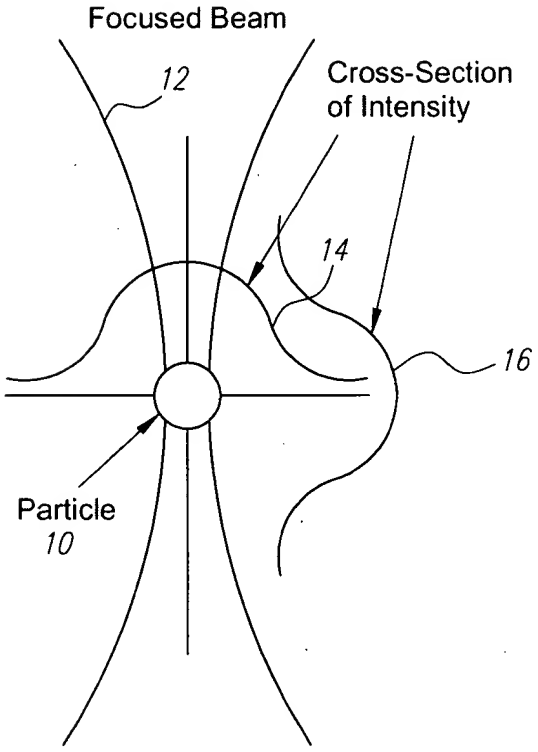

$$F_{\nabla} = 2\pi \cdot r^3 \frac{\sqrt{\varepsilon_B}}{c} \left(\frac{\varepsilon - \varepsilon_B}{\varepsilon + 2\varepsilon_B} \right) (\nabla \cdot I)$$

F_{∇} = Optical force on particle towards higher intensity

r = Radius of particle

ε_B = Dielectric constant of backround medium

ε = Dielectric constant of particle

I = Light intensity (W/cm^2)

∇ = Spatial derivative

FIG. 1

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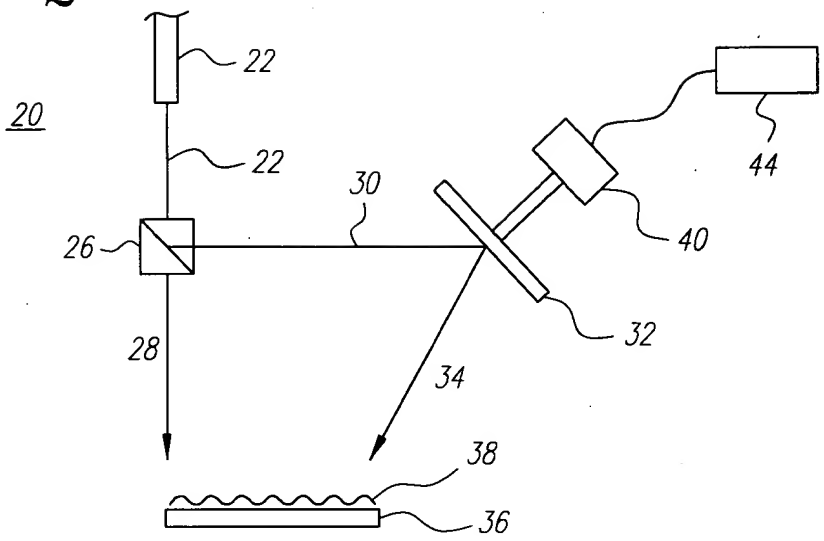
FIG. 2



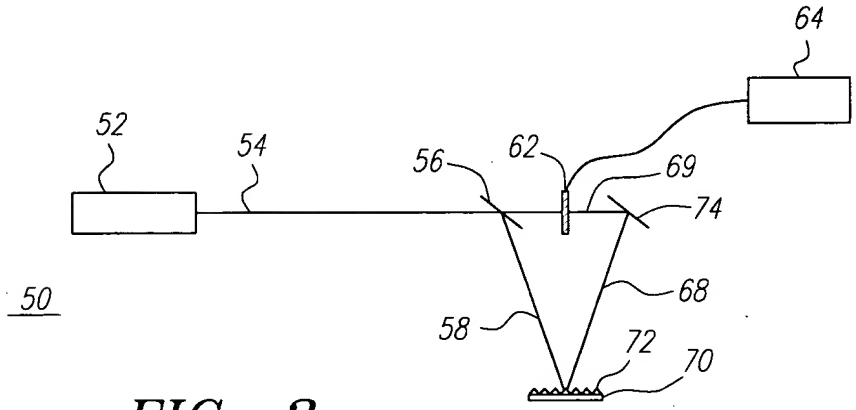


FIG. 3

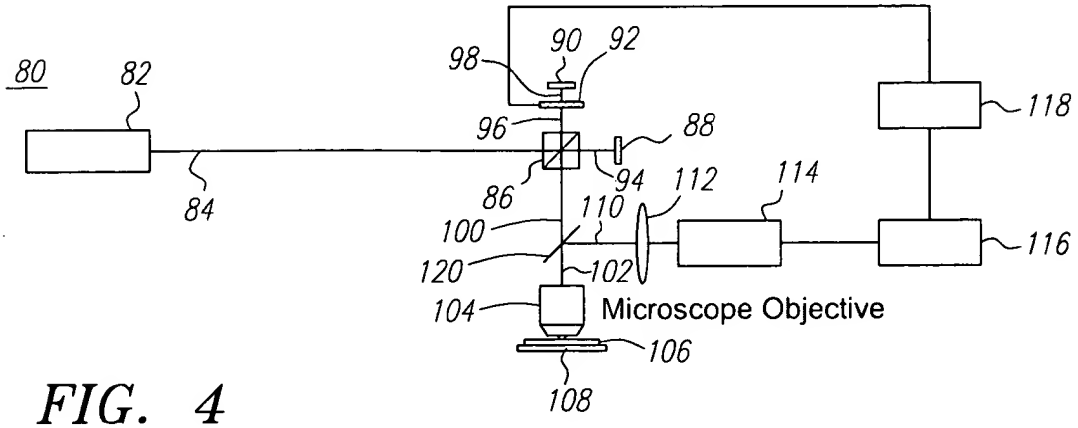


FIG. 4

Patent: 6,545,790

FOREIGN PATENT

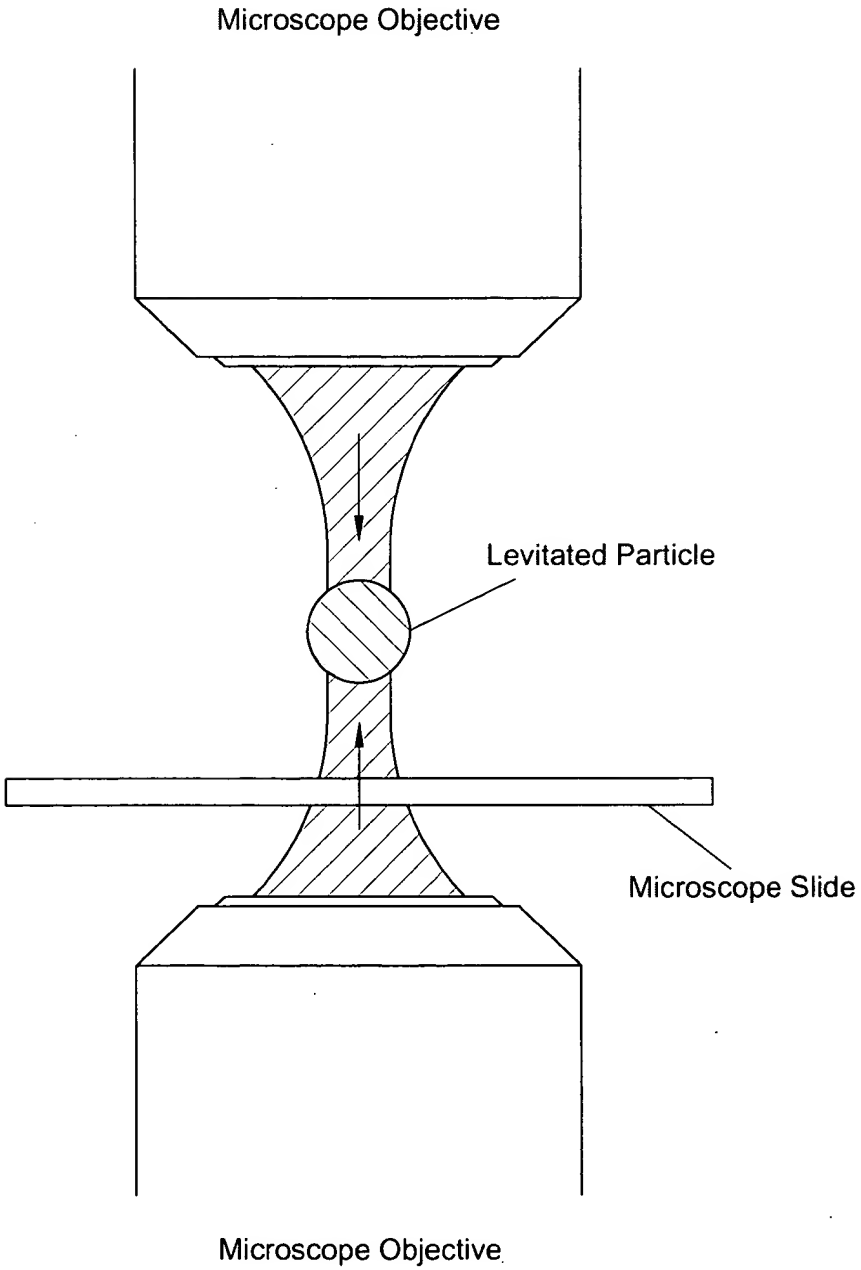


FIG. 4A

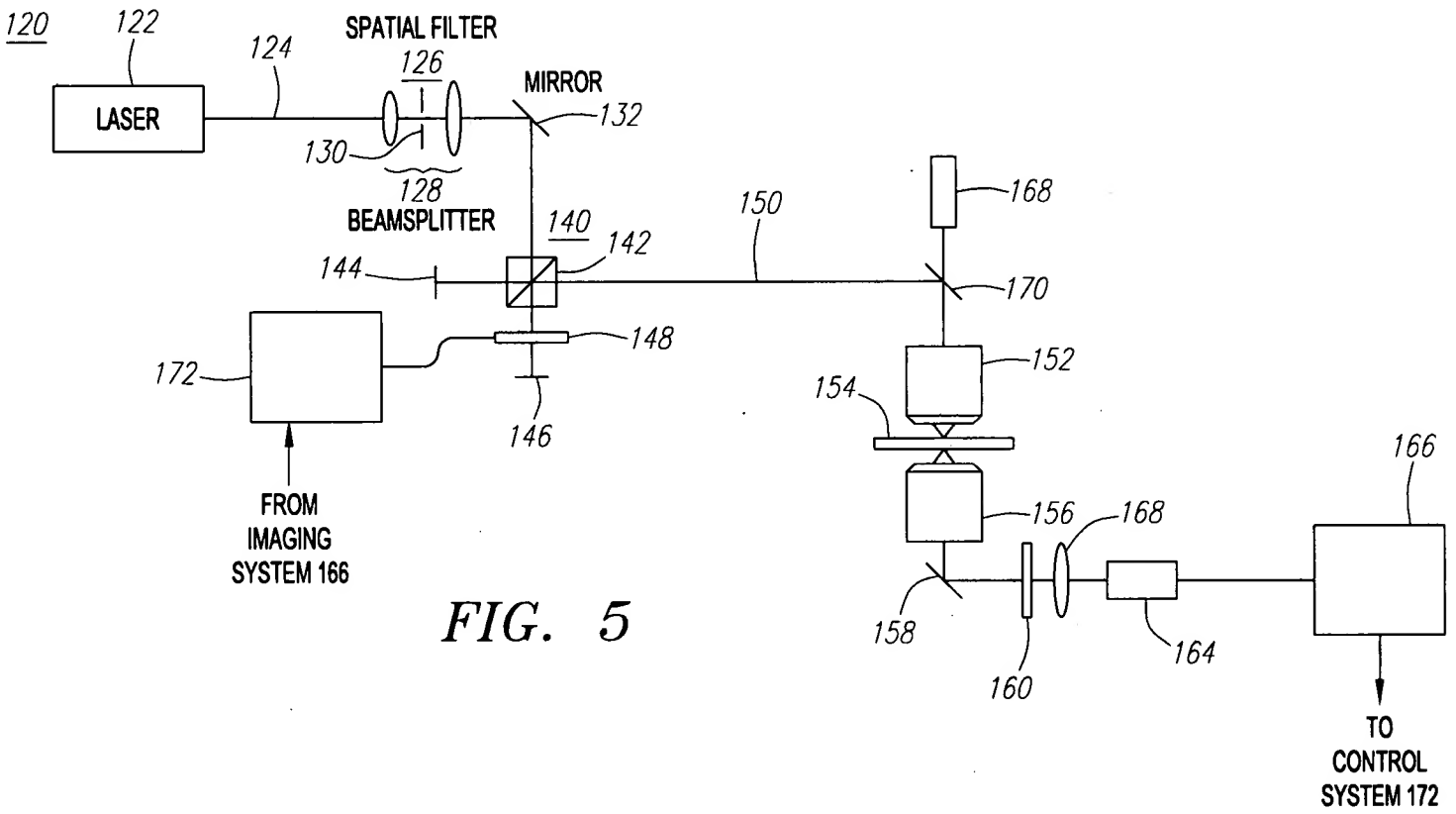

120
122
LASER
124
SPATIAL FILTER
126
130
128
MIRROR
132
BEAMSPLITTER
140
142
144
150
168
170
148
172
146
152
154
FROM
IMAGING
SYSTEM 166
156
168
166
158
160
164
TO
CONTROL
SYSTEM 172

FIG. 5

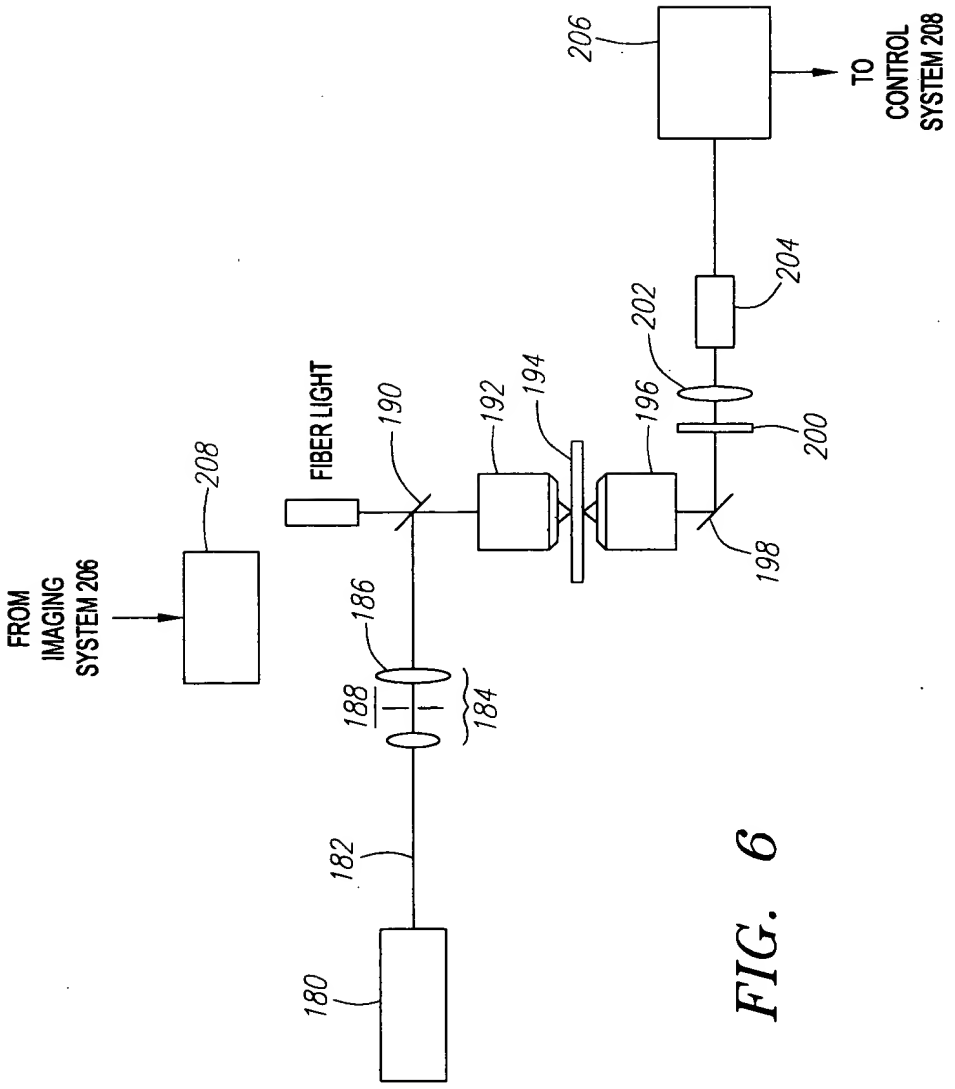

FROM IMAGING SYSTEM 206
208
FIBER LIGHT
190
192
194
196
202
204
206
TO CONTROL SYSTEM 208
186
188
184
182
180
198
200

FIG. 6

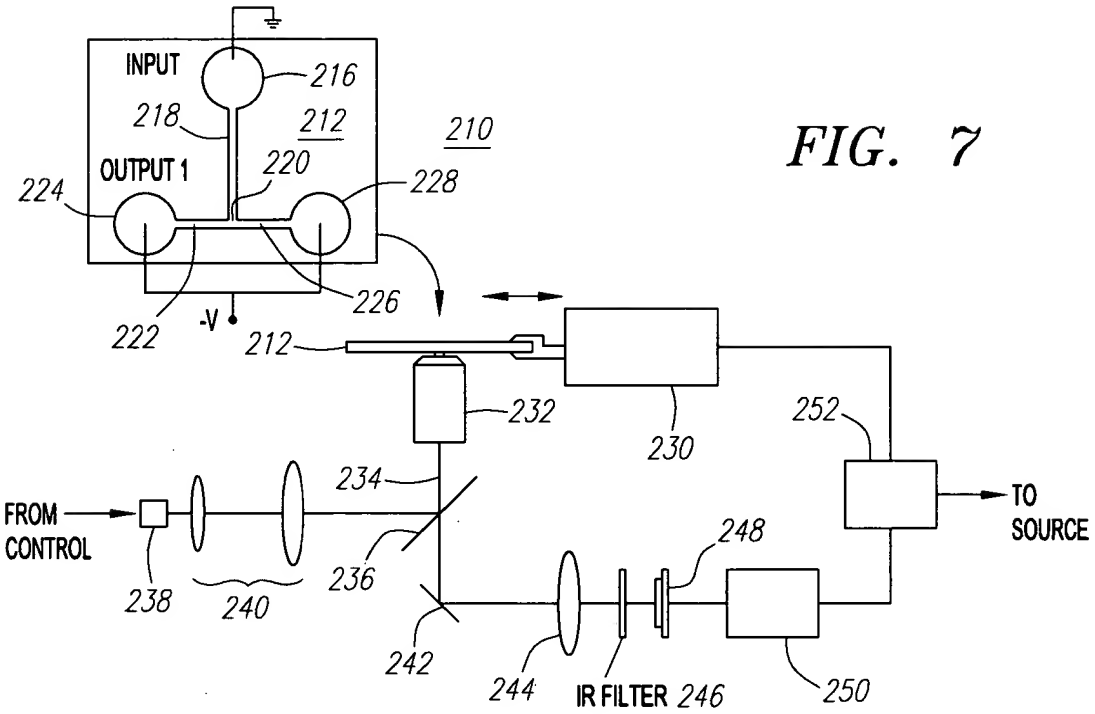


FIG. 7

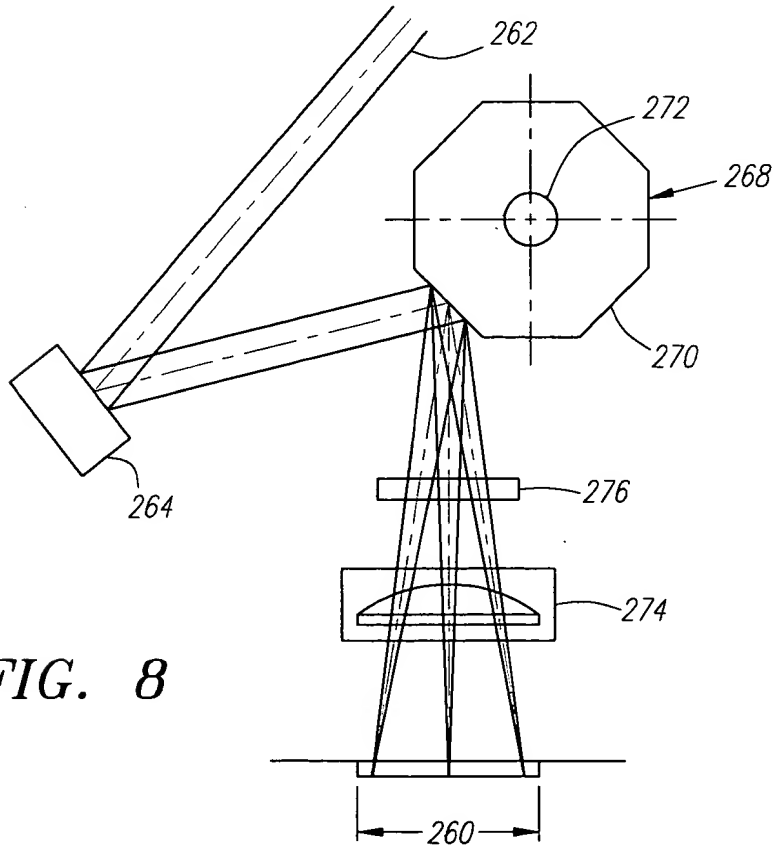


FIG. 8

09/30/2005 15:40 #1171 P.009

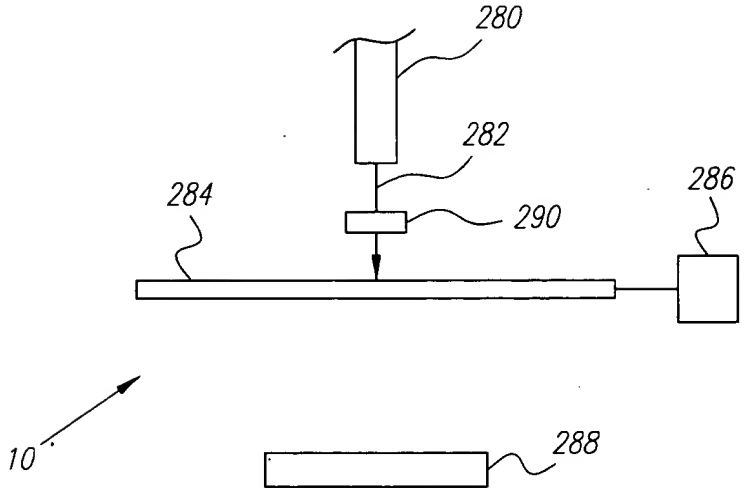


FIG. 9A

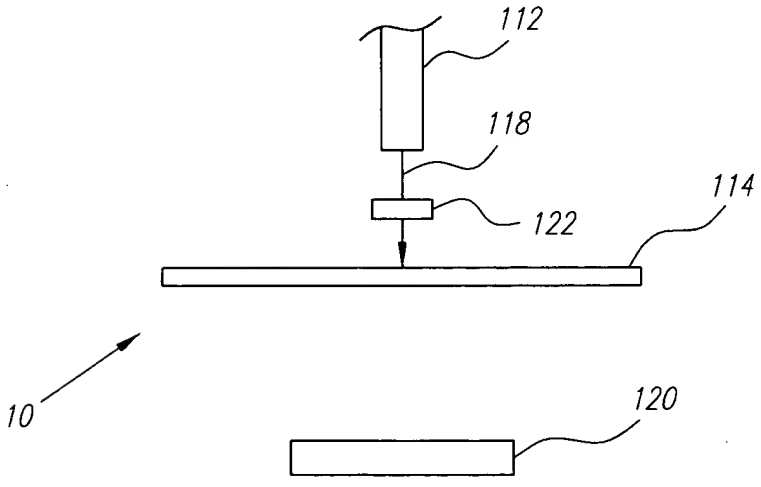


FIG. 9B

Patent: 9,265,660

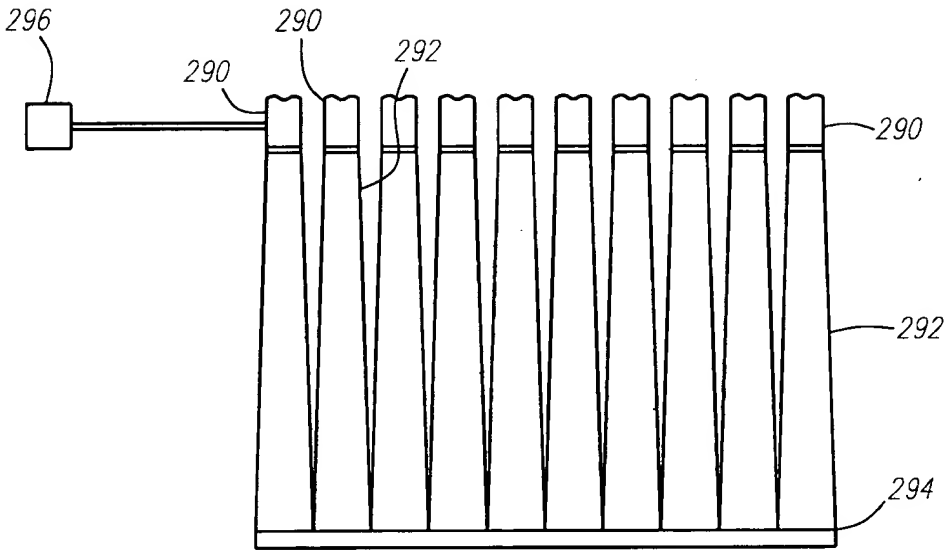


FIG. 10

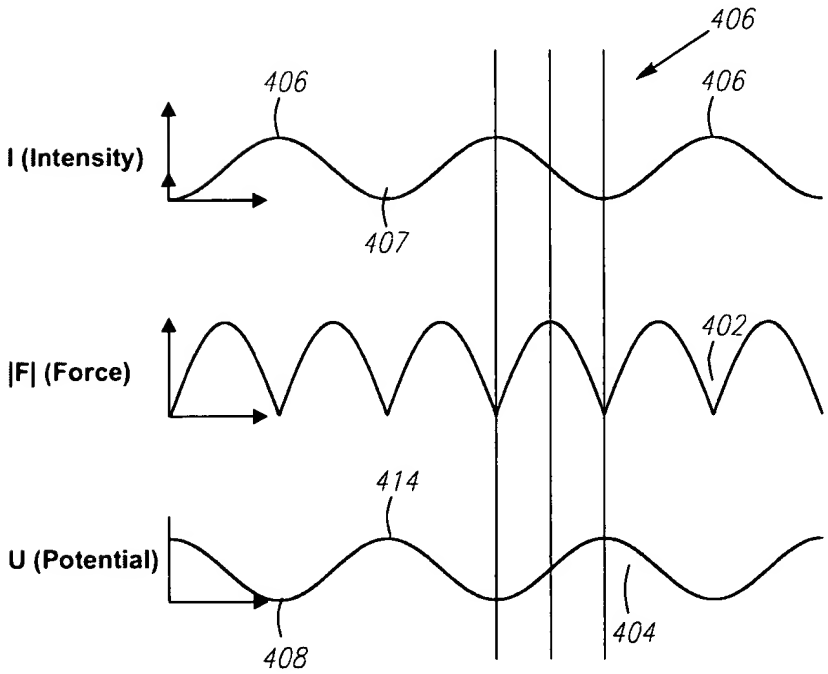


FIG. 11A

FIG. 11B

FIG. 11C

Patent 9,836,650

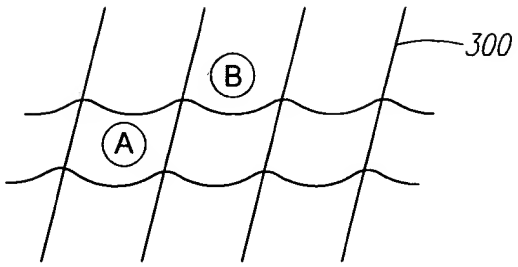


FIG. 12A

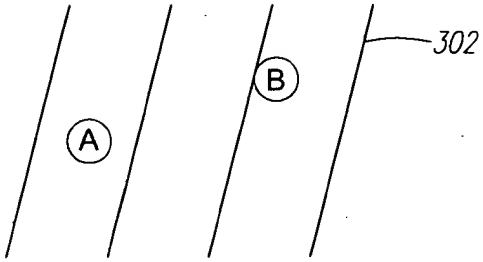


FIG. 12B

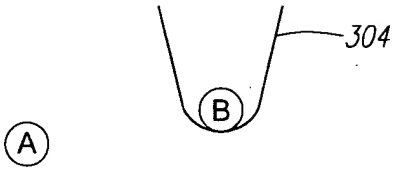


FIG. 12C

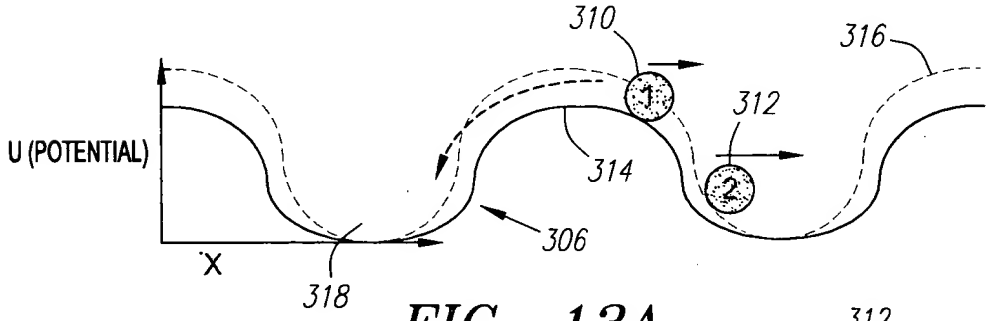


FIG. 13A

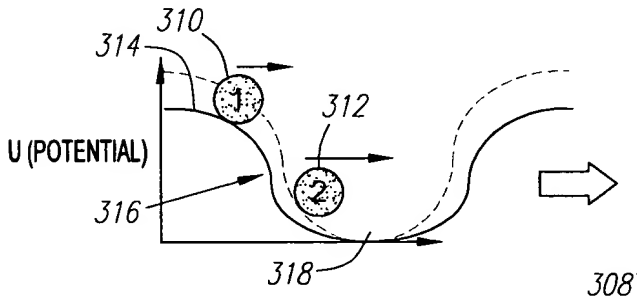


FIG. 13B

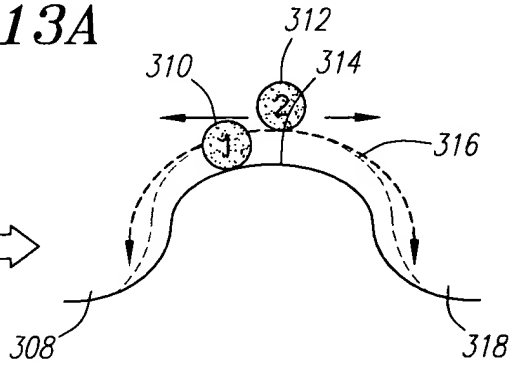


FIG. 13C

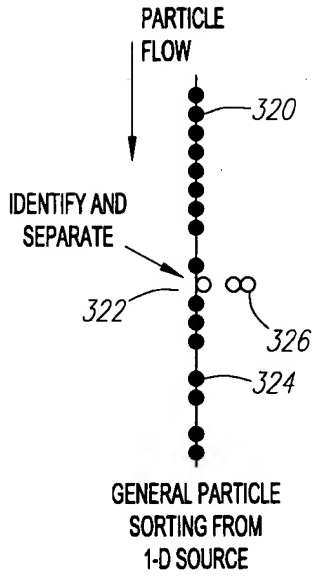


FIG. 14A

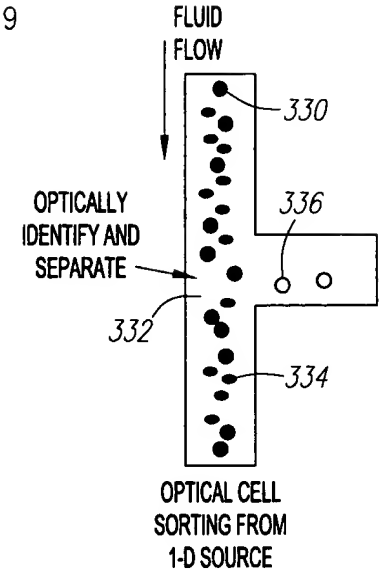


FIG. 14B

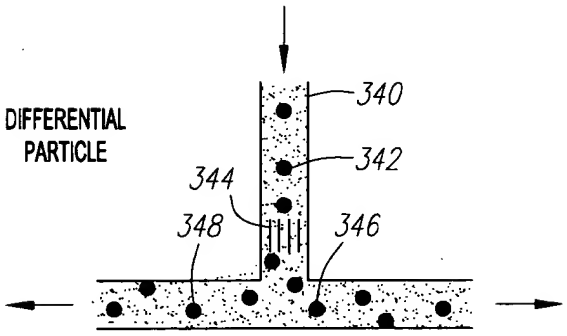


FIG. 15

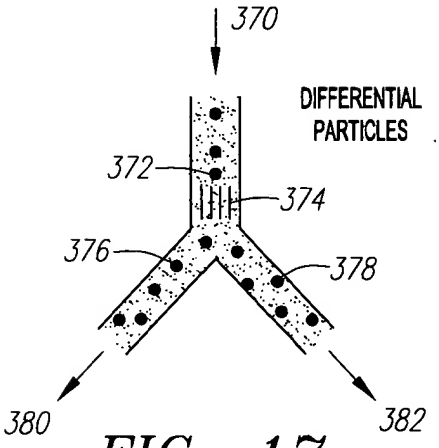


FIG. 17

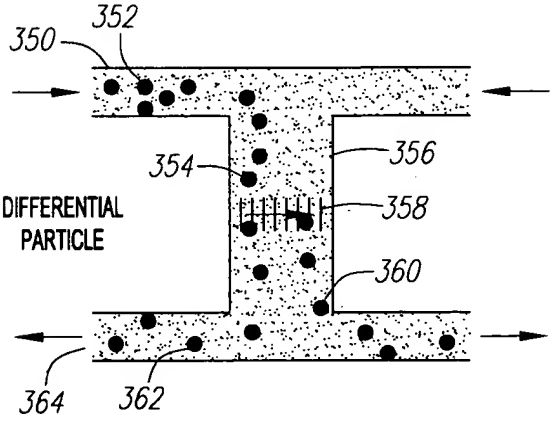


FIG. 16

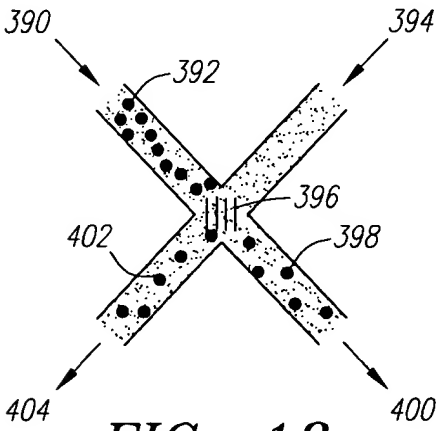


FIG. 18

1041141-9936560

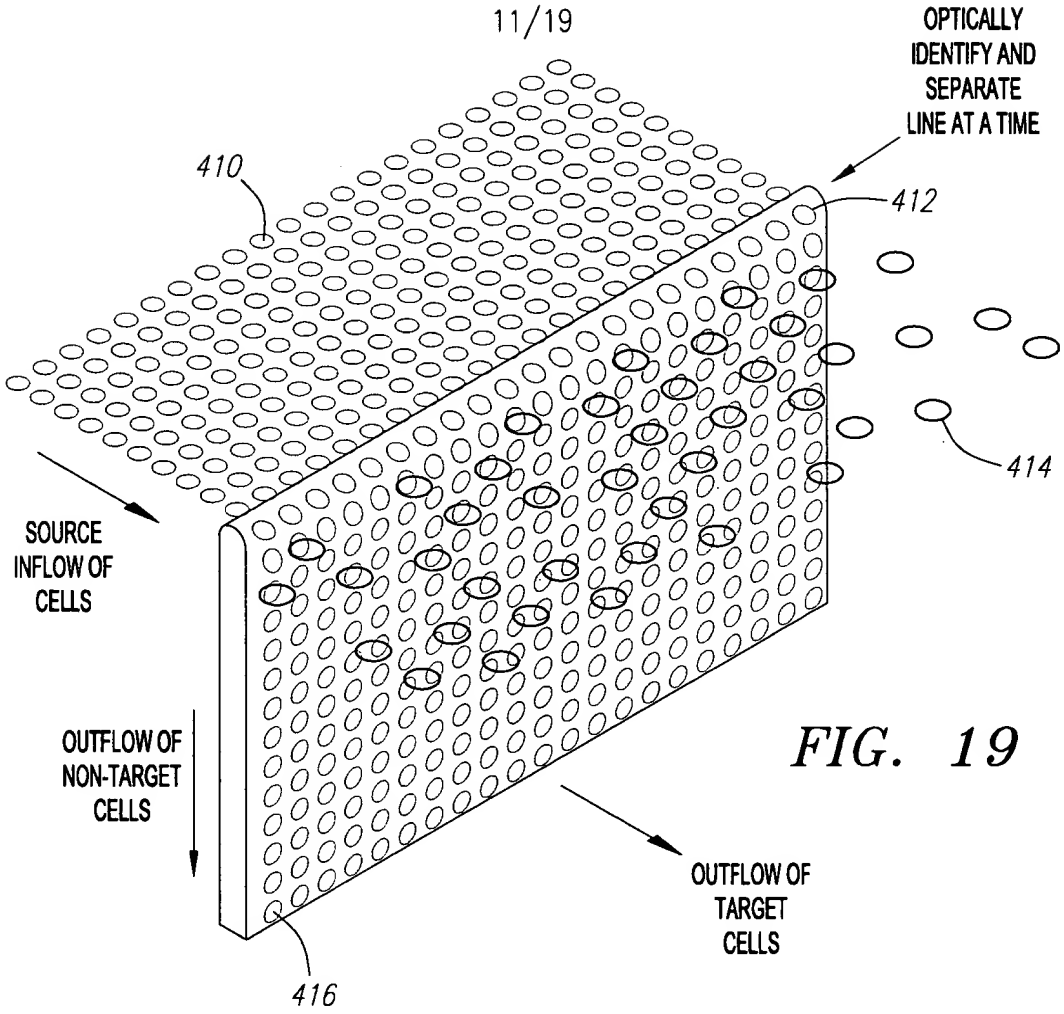


FIG. 19

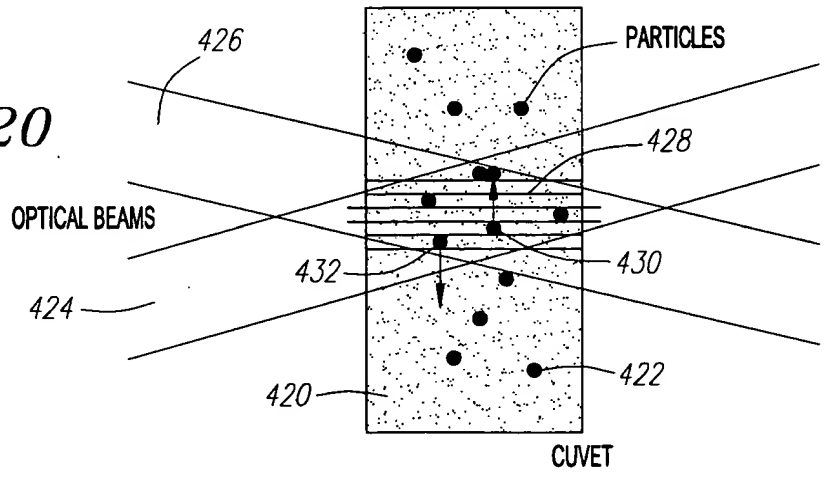


FIG. 20

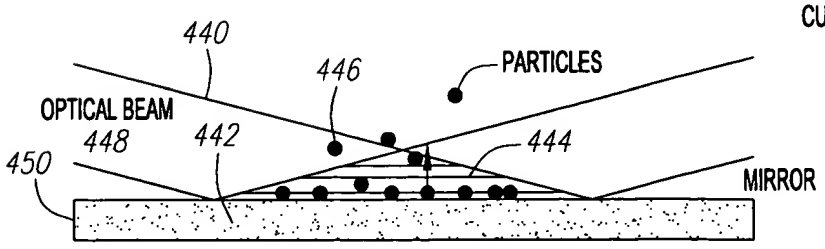


FIG. 21

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WO 2004/113936 PCT/US2004/019448

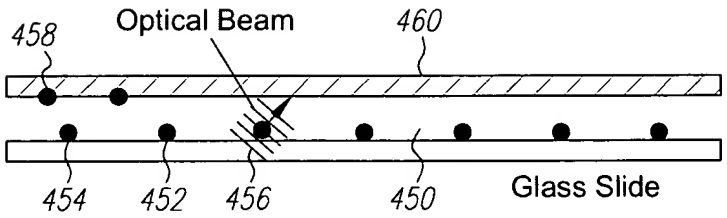


FIG. 22

PCT/US2004/000000

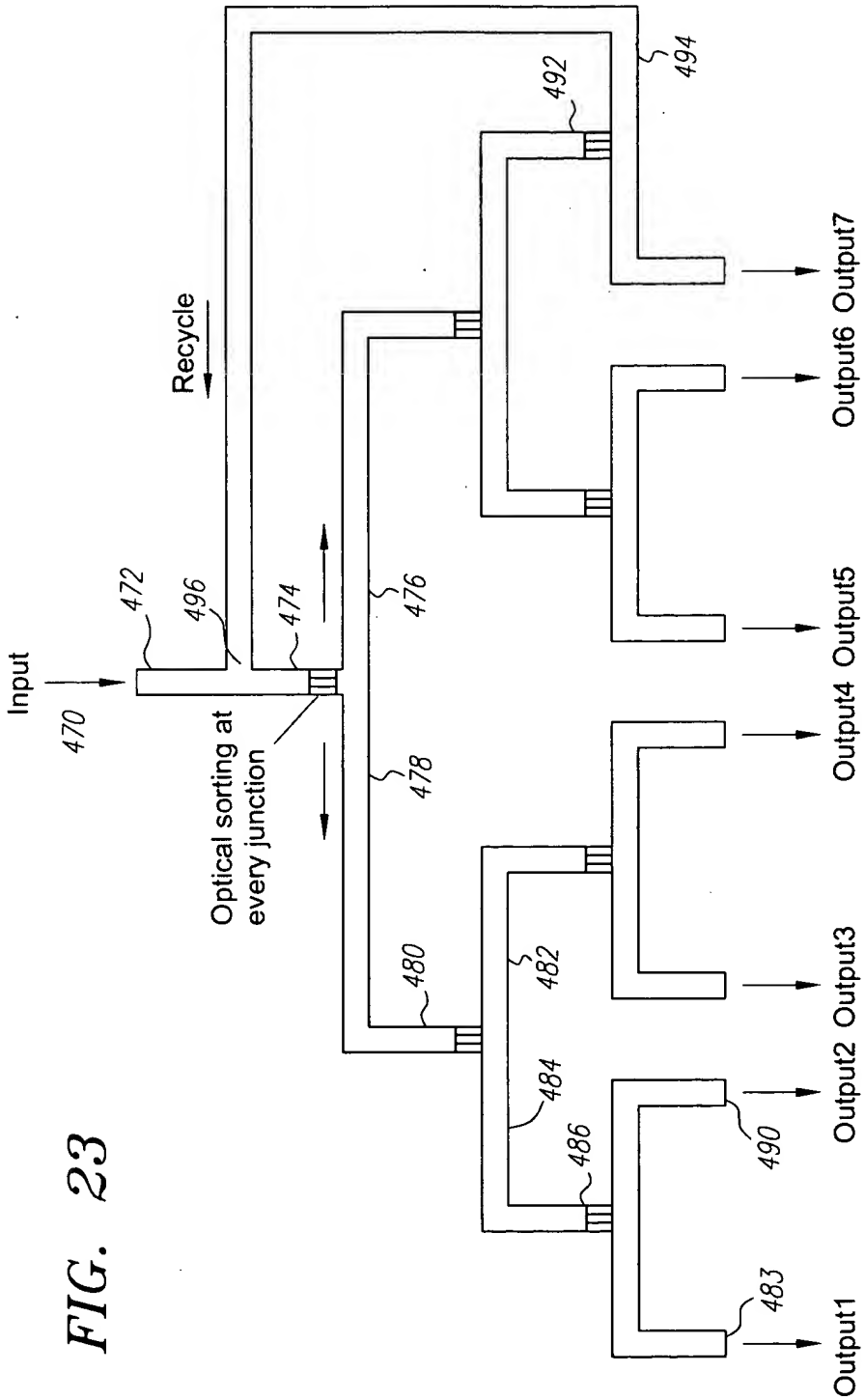


FIG. 23

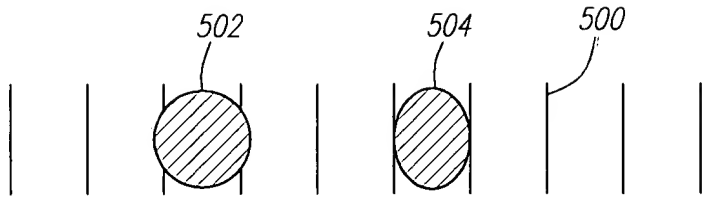


FIG. 24

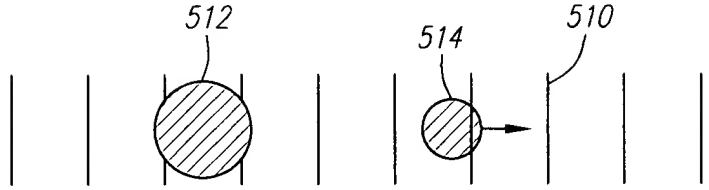
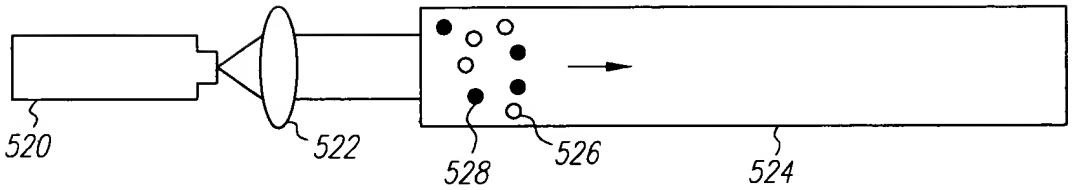


FIG. 25

SCATTER FORCE SEPARATION

Before:



After:

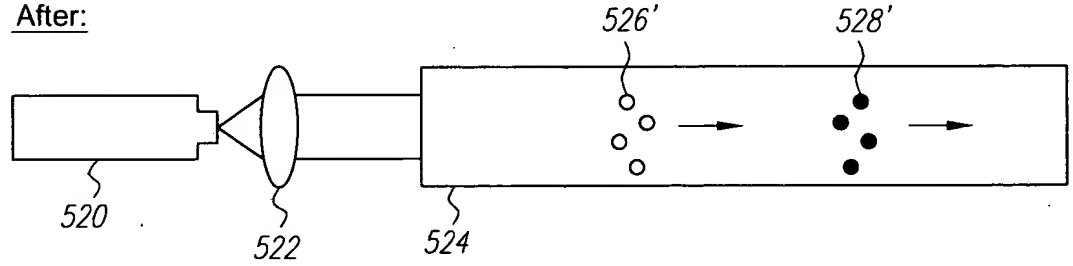


FIG. 26

FD-ETT: 9/5/5650

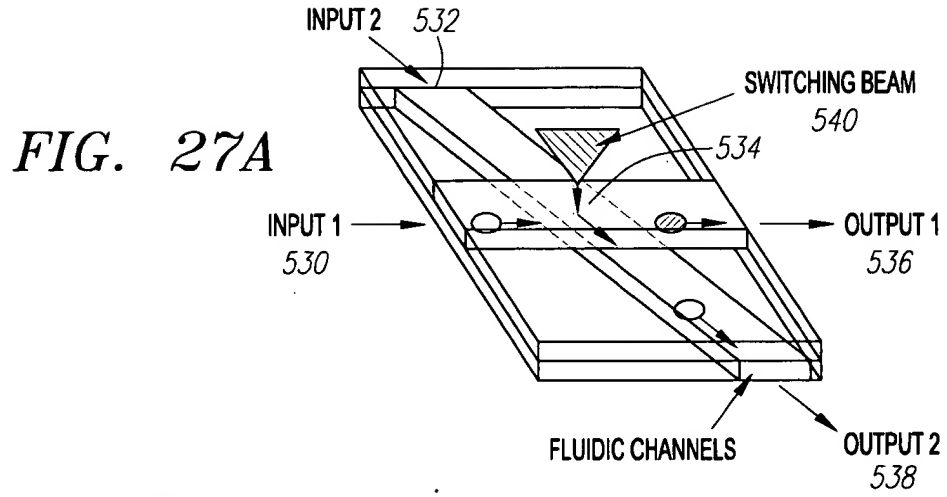


FIG. 27A

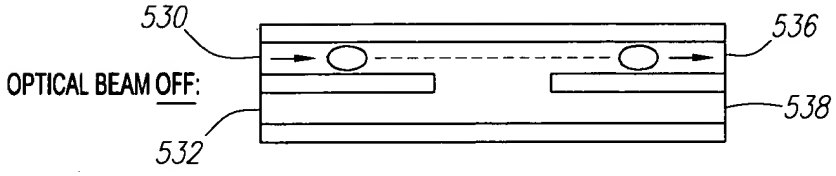


FIG. 27B

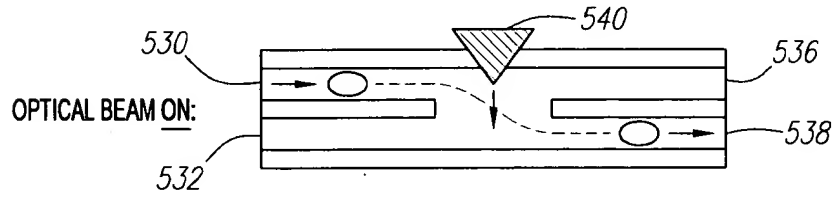


FIG. 27C

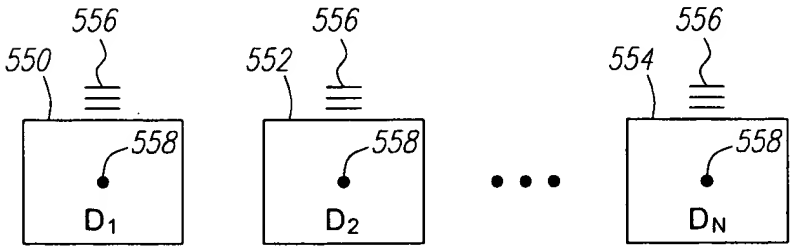


FIG. 28

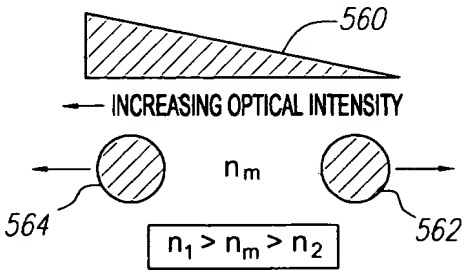


FIG. 29

EP 0 744 636 A2

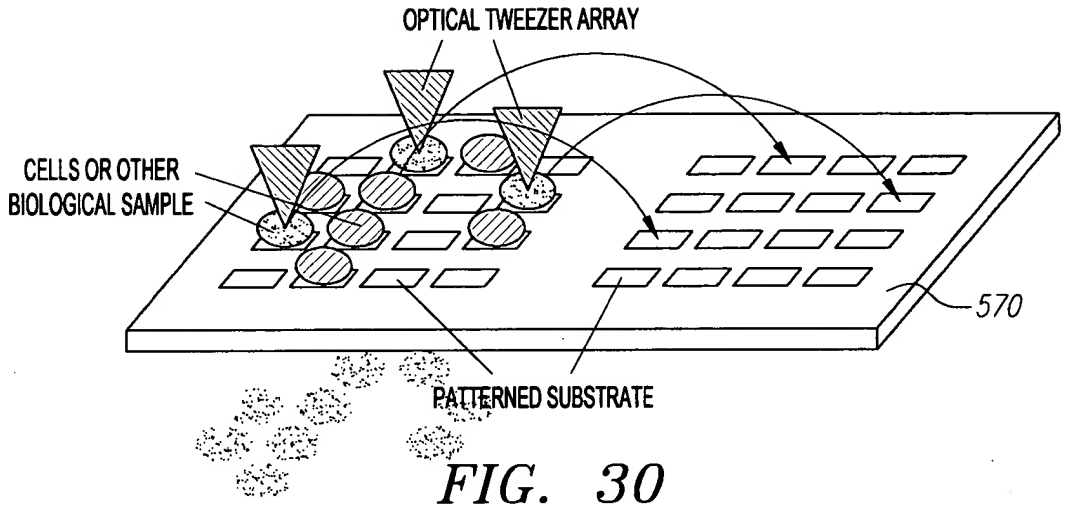

OPTICAL TWEEZER ARRAY
CELLS OR OTHER
BIOLOGICAL SAMPLE
570
PATTERNED SUBSTRATE

FIG. 30

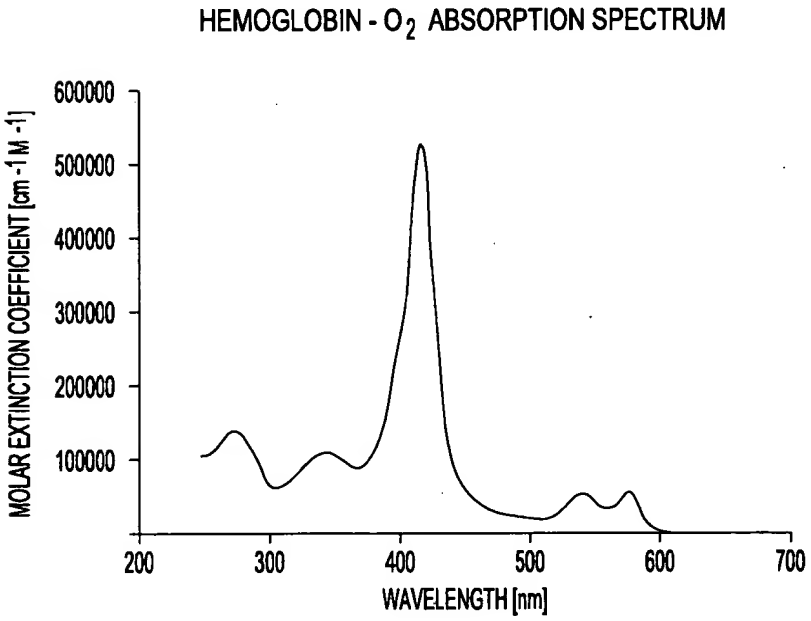

HEMOGLOBIN - O_2 ABSORPTION SPECTRUM
MOLAR EXTINCTION COEFFICIENT [cm -1 M -1]
600000
500000
400000
300000
200000
100000
200
300
400
500
600
700
WAVELENGTH [nm]

FIG. 31

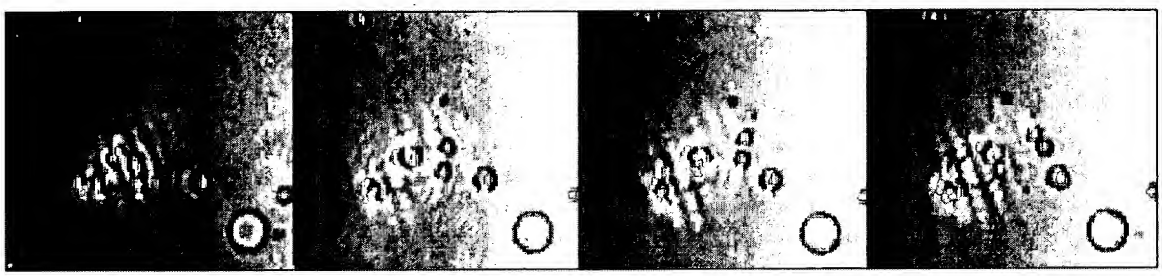


FIG. 32

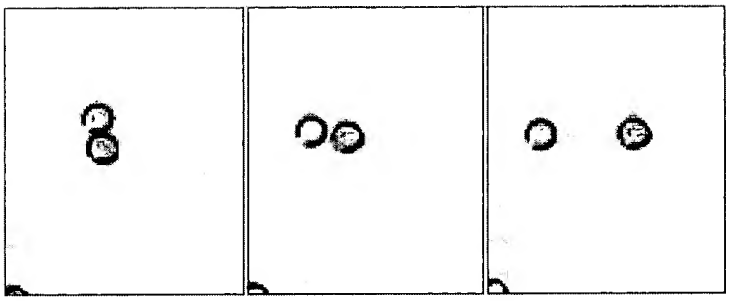
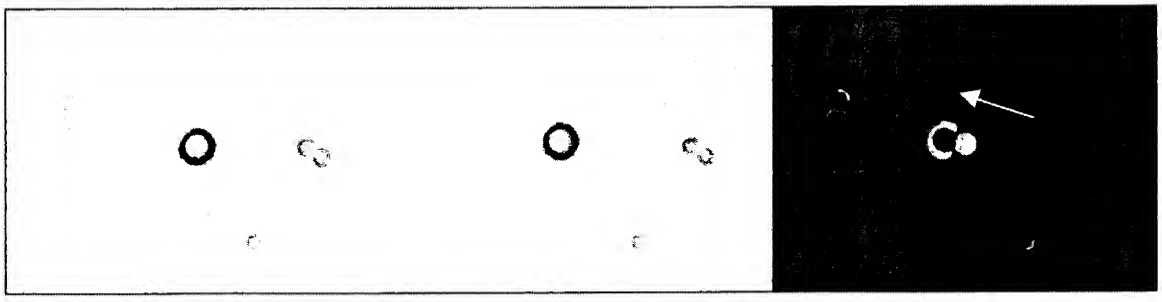


FIG. 33



Before After Difference

FIG. 34

FOIPLE: 9/5/2006

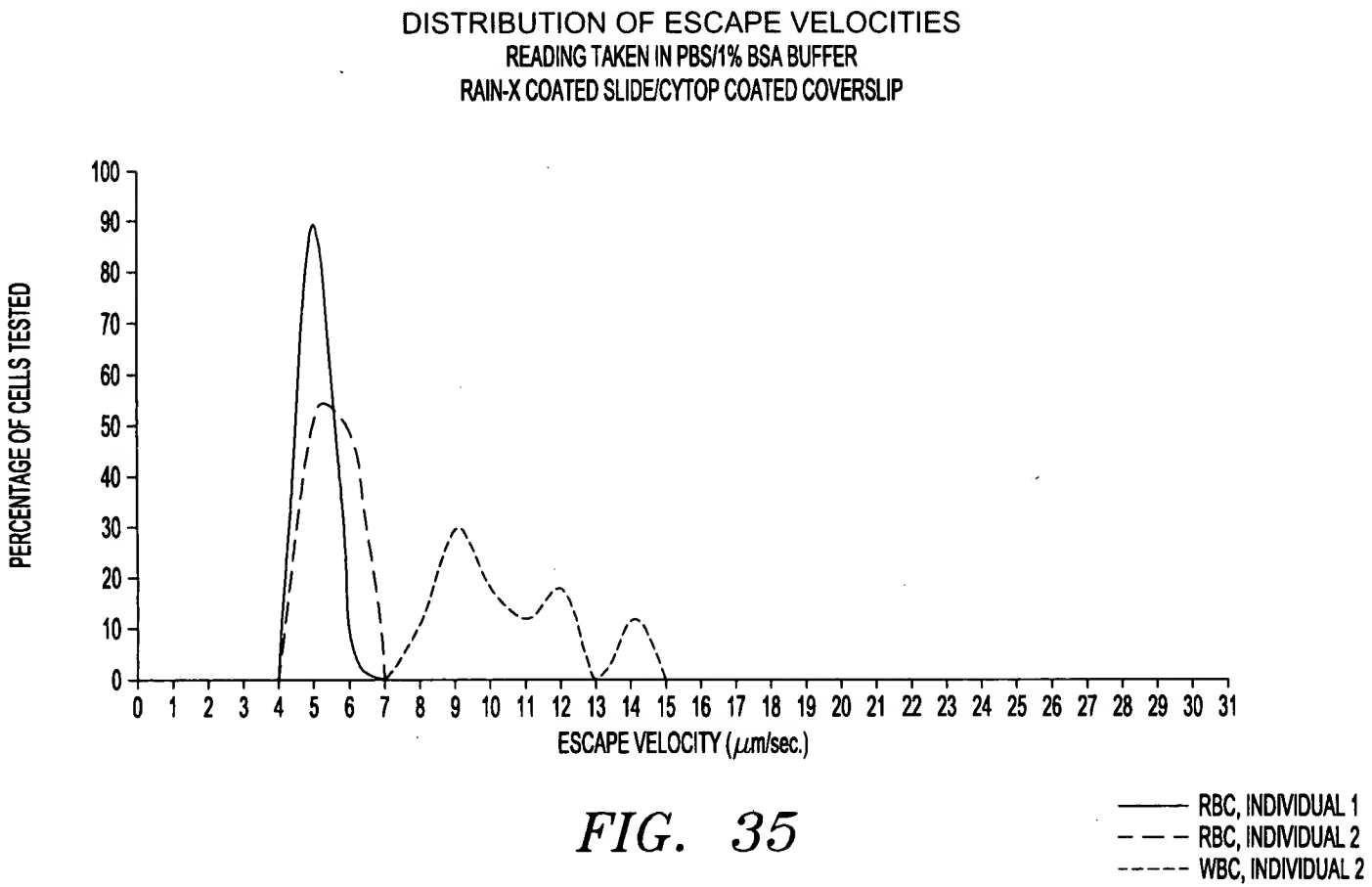

DISTRIBUTION OF ESCAPE VELOCITIES
READING TAKEN IN PBS/1% BSA BUFFER
RAIN-X COATED SLIDE/CYTOP COATED COVERSLIP
PERCENTAGE OF CELLS TESTED
100
90
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
ESCAPE VELOCITY (μm/sec.)
RBC, INDIVIDUAL 1
RBC, INDIVIDUAL 2
WBC, INDIVIDUAL 2

FIG. 35

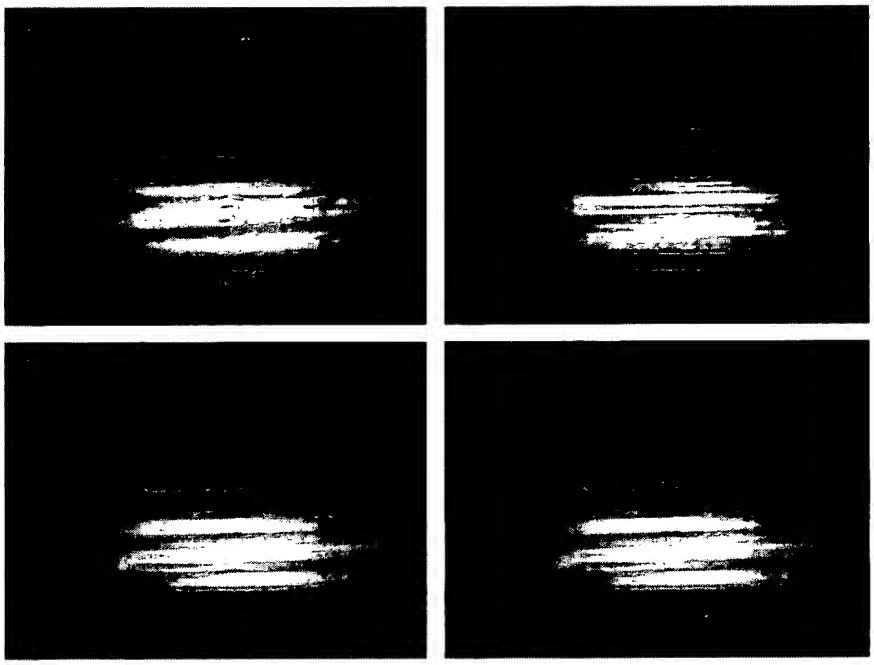


FIG. 36

09/993,376 - 11/14/01